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ENVIRONMENT

Mr. Keith M. Krawczyk
Project Coordinator
MDEQ-RRD-Superfund
Constitution Hall – 3rd Floor South
525 West Allegan Street
Lansing, Michigan 48909-7926

Subject:
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
King Highway Landfill Operable Unit 3
North Pore Water Outlet and Final Cover Soil Sampling Results

Date:
August 15, 2012

Contact:
Patrick McGuire

Phone:
315.671.9233

Email:
pat.mcguire@arcadis-us.com

Our ref:
B0064583.0003.00907 #2

Dear Mr. Krawczyk:

On behalf of Georgia-Pacific LLC (Georgia-Pacific), this document has been prepared to provide the results from the north pore water outlet and final cover soil sampling conducted at the King Highway Landfill Operable Unit 3 (KHL OU) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site). This document is organized as follows:

1. Background information related to the north pore water outlet discharge
2. Summary of recent sampling activities
3. Field investigation findings
4. Proposed corrective measures
5. Schedule

These items are further discussed below.

1. Background Information Related to the North Pore Water Outlet Discharge

On February 27, 2012, the Michigan Department of Environmental Quality (MDEQ) informed Georgia-Pacific of rust-colored staining of the discharge observed at the north pore water outlet (MDEQ 2012; Figure 1). On March 8, 2012, representatives from MDEQ, Georgia-Pacific, and ARCADIS participated in a conference call to discuss the next steps for investigating the cause of the rust-colored staining of the discharge from the north and south pore water outlets[1]. During the call, Georgia-Pacific agreed to develop a sampling plan to evaluate the cause of the rust-colored discharge at the north and south pore water outlets.

[1] Rust-colored staining of the discharge from the south pore water outfall had previously been observed by MDEQ, as documented in various e-mail correspondences between MDEQ and ARCADIS in January 2009 and June 2010. Refer to references list for specific e-mail correspondence.

Subsequently, the Sampling Plan for the Pore Water Collection System Outfalls (Pore Water Sampling Plan; ARCADIS 2012a) was submitted to MDEQ on March 20, 2012 for review. MDEQ did not provide formal approval of this plan. However, MDEQ was notified on May 15, 2012 via e-mail of Georgia-Pacific's intention to conduct the pore water sampling activities during upcoming annual groundwater and quarterly landfill gas monitoring activities (ARCADIS 2012b).

2. Summary of Recent Sampling Activities

On May 31, 2012, ARCADIS met with CDM Smith at the KHL to collect samples from the north and south pore water outlets (refer to Figure 1) in accordance with the Pore Water Sampling Plan. Upon initial inspection of the north pore water outlet, the outlet was observed to be discharging at an extremely low rate. Further inspection of the outlet indicated that the end of the outlet pipe was clogged with a large root mass, limiting the flow from the pipe. A hand shovel was used to dislodge a portion of the root mass from the pipe, allowing the pore water to rapidly discharge from the end of the outlet pipe.

The initial appearance of the pore water exiting the outlet pipe was orange. A sample of this orange-colored pore water (NP-1) was collected. Approximately 15 minutes following removal of the root mass from the end of the pore water outlet and the initial discharge of the orange-colored pore water, clear water began to discharge from the outlet pipe. A sample of the clear pore water (NP-2) was also collected, and both samples were submitted to KAR Laboratories, Inc. (KAR) for total and dissolved iron analysis. Sample results associated with north pore water outlet samples NP-1 and NP-2 are provided in Table 1.

The area of the KHL where the south pore water outlet is located was inspected; however, the outlet pipe could not be found as the pipe is potentially buried underneath riprap at the outlet. Inspection of the riprap around the approximate location of the outlet pipe did not reveal any discharge associated with the outlet. Therefore, a sample of the south pore water outlet discharge was not collected.

In addition to the pore water, soil samples were collected from the drainage/barrier protection layer (SV-Sand-PL) and from the vegetative layer (SV-Soil-VL) of the final cover system within the area of stressed vegetation located immediately south of the diversion berm on the north side of the KHL. Two more soil samples were collected from the drainage/barrier protection layer (RR-Sand-PL) and from the vegetative layer (RR-Soil-VL) of the final cover system within an area of healthy vegetation, located south of the site access road on the north side of the KHL. Both samples were submitted to KAR for iron analysis to evaluate whether elevated levels of iron in the soil cover material of the final cover system are contributing to the discoloration of the water observed at the outlets. Results associated with soil samples SV-Sand-

PL, SV-Soil-VL, RR-Sand-PL, and RR-Soil-VL are included in Table 2. Please note that sample RR-Soil-VL was not analyzed for iron due to an error in completing the chain-of-custody form.

3. Field Investigation Findings

As presented in Table 2, relatively elevated iron concentrations in the vegetative (11,900 milligrams per kilogram [mg/kg]) and drainage/barrier protection layers (5,140 mg/kg and 6,340 mg/kg), as compared to the mean background iron concentration in topsoil (2,432 mg/kg) and sand (3,418 mg/kg) in the Michigan glacial lobe area (from the 2005 Michigan Background Soil Survey [MDEQ 2005]) would suggest that the ferric iron present in the final cover soil is being converted to dissolved ferrous iron as rainwater infiltrates through the final cover soils. The dissolved ferrous iron in the water is then routed to the pore water collection system piping. When the pore water is exposed to oxygen, the oxygen causes the dissolved ferrous iron to oxidize and convert to ferric hydroxide (rust), which yields an orange-colored appearance in the water.

This conclusion is further supported by the high total iron concentration measured in the first pore water sample NP-1 of 531 milligrams per liter (mg/L), and the non-detection of dissolved iron (<0.01 mg/L) in the same sample (refer to Table 1). While the rust particulates in NP-1 could be seen in the orange-colored appearance of the water discharging from the north pore water outlet at that time, this sample is not representative of the pore water discharge from this outlet, as the pore water outlet was obstructed for an unknown period of time, which can rust particulates to accumulate in the water.

As presented in Table 1, the second pore water sample NP-2 had a total iron concentration of 2.62 mg/L, which was significantly lower than the first sample NP-1, and a dissolved iron concentration of 0.45 mg/L, which was greater than the first pore water sample NP-1 (refer to Table 1). NP-2 was collected approximately 15 minutes after removing the obstruction from the outlet, and was clear at the time that the sample collected. Since the pore water outlet was designed to have a free flowing discharge with limited retention time in the pore water piping system prior to discharge, sample NP-2 is more representative of the actual pore water discharge from the north pore water outlet.

The analytical results associated with sample NP-2 was compared to MDEQ's Part 201 direct contact criterion for iron in groundwater of 58,000 mg/L (MDEQ 2011a) (refer to Table 1). The total and dissolved iron concentrations in the pore water from sample NP-2 were significantly lower than MDEQ's Part 201 direct contact criterion for iron in groundwater. The analytical results associated with the samples collected from sand fill within the drainage/barrier protection layer (RR-Sand-PL and SV-Sand-

PL), and topsoil within the vegetative layer (SV-Soil-VL) of the final cover system were compared to MDEQ's Part 201 direct contact criterion for iron in soil of 16,000 mg/kg (MDEQ 2011b). The iron concentrations in all three soil samples were less than the applicable criteria. The analytical results for both groundwater and soil indicate that the iron concentrations in the pore water and final cover soil do not pose any potential risk to human health or the environment for direct contact with the soil.

Table 3 presents historical iron concentrations associated with floodplain soil samples collected along the Kalamazoo River by Georgia-Pacific in 1993 and 1999, upgradient of the KHL at the Willow Boulevard/A-Site Operable Unit, along the KHL, and downgradient of the KHL at the Mill Lagoons and King Street Storm Sewer (refer to Figure 2). The iron concentrations associated with the floodplain soil samples along this area of the Kalamazoo River range from 2,900 to 24,000 mg/kg, with an average iron concentration of 10,105 mg/kg. The iron concentrations associated with these floodplain soil samples further signify the presence of iron at elevated concentrations in the native soils of this area.

Due to the fact that the north pore water outlet discharges water to the Kalamazoo River, the pore water sample results associated with NP-2 were also compared to surface water criteria. Since the MDEQ Rule 57 Surface Water Quality Values (MDEQ 2011c) does not include a surface water criterion for iron, the pore water sample results for NP-2 were compared to the United States Environmental Protection Agency (USEPA) National Ambient Water Quality Criteria (NAWQC), specifically, freshwater Criterion Continuous Concentrations (CCCs) for aquatic life (USEPA 2012). The total iron concentration for sample NP-2 was above this criterion (1.0 mg/L; refer to Table 1). However, for reasons discussed below, it is not anticipated that the pore water being discharged to the Kalamazoo River would pose a risk to aquatic life.

To compare the effect that groundwater discharge versus the pore water discharge to the river would have on surface water iron concentrations, historical iron concentrations measured in groundwater and surface water by Georgia-Pacific in 1993 and 1994 were reviewed. Table 4 presents the historical groundwater sample results for iron collected from the KHL monitoring well locations identified on Figure 1. In 1993, the iron concentrations in groundwater samples collected from monitoring wells at the KHL were all greater than the iron concentration in pore water sample NP-2. Table 5 presents historical iron concentrations associated with surface water samples collected from the Kalamazoo River upstream and downstream of the KHL OU in 1993 and 1994, at the locations shown on Figure 3. The iron concentrations associated with the surface water samples collected in 1993 and 1994 were all below the USEPA NAWQC freshwater CCC for iron. These data indicate that iron concentrations in groundwater that discharged to the Kalamazoo River in 1993 did not have an effect on the iron concentrations in the river.

In conclusion, current groundwater sampling data indicate that groundwater discharging to the Kalamazoo River contains iron concentrations greater than the pore water discharging from the north pore water outlet, which has not adversely affected the iron concentrations in the river as indicated by the 1993 and 1994 surface water samples collected from the river. Provided the lower iron concentrations detected in the pore water as compared to the historical groundwater data (3 to 6 times lower), it is not anticipated that the iron concentrations in the river will rise above the historical levels. Furthermore, the pore water that from the north outlet pipe discharges onto riprap along the riverbank before entering the river. When the water trickles over the riprap, the water becomes aerated causing the dissolved iron to form rust particles that are allowed to settle out of the water before entering the river, further reducing the concentration of iron entering the river. Thus, it is not anticipated that the iron concentrations in the pore water discharging from the north pore water outlet will have an effect on the iron concentrations in the Kalamazoo River.

4. Proposed Corrective Measures

To reduce the potential for pore water to become stagnate within the pore water collection system piping—which seems to have caused the iron to oxidize in the pipe and allowed rust particulates to build up in the accumulated pore water, as indicated by the elevated total iron concentration and orange-colored appearance of the water—the pore water outlets will now be inspected during future quarterly landfill inspections. Any obstructions observed during the inspections will be removed promptly.

In addition, Georgia-Pacific proposes to continue monitoring the pore water discharge from the north and south pore water outlets by collecting samples from the outlets during the next four quarterly landfill gas monitoring events (if the outlets are observed to be discharging pore water at the time of sampling), and analyzing the samples for iron.

5. Schedule

Georgia-Pacific plans to continue inspection of the north and south pore water outlets during the quarterly landfill inspections. The next quarterly landfill inspection is scheduled for August 2012. In addition, Georgia-Pacific proposes to sample the discharge from the north and south pore water outlets during the next four quarterly landfill gas monitoring events, if the outlets are discharging at the time of sampling. The 2012 3rd quarter landfill gas monitoring event is schedule for August 23, 2012.

If you have any questions, please do not hesitate to contact me.

Sincerely,

ARCADIS

Patrick McGuire
Principal Environmental Engineer

Enclosures:

Table 1	North Pore Water Outlet Sampling Results for Iron
Table 2	Final Cover Soil Sampling Results for Iron
Table 3	Historical Kalamazoo River Floodplain Soil Sampling Results for Iron
Table 4	Historical King Highway Landfill Groundwater Sampling Results for Iron
Table 5	Historical Kalamazoo River Surface Water Sampling Results For Iron
Figure 1	Pore Water and Soil Sampling Locations
Figure 2	Floodplain Soil Sampling Locations
Figure 3	Surface Water Sampling Locations Upstream and Downstream of King Highway Landfill

Copies:

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Judith Alfano, MDEQ
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Garry Griffith, P.E., Georgia-Pacific
Dawn Penniman, P.E., ARCADIS

References:

ARCADIS. 2009. E-mail from ARCADIS to MDEQ Regarding the Discharge from the South Pore Water Outfall. January 30, 2009.

ARCADIS. 2010a. E-mail from ARCADIS to MDEQ Regarding the Sampling Parameters for Pore Water. June 4, 2010.

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ARCADIS. 2010c. E-mail from ARCADIS to MDEQ Regarding an Evaluation of the Pore Water Discharge. June 14, 2010.

ARCADIS. 2010d. Letter from ARCADIS to MDEQ Proposing Modifications to the Current Hydrogeologic Monitoring Plan. November 12, 2010.

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ARCADIS. 2012b. E-mail from ARCADIS to MDEQ Regarding the Water Level Measurements Collections and Flow Reversal Conditions Assessment. May 15, 2012.

MDEQ. 2005. Michigan Background Soil Survey. Hazardous Water Technical Support Unit. Hazardous Waste Section. Waste and Hazardous Materials Division. 2005. http://www.michigan.gov/documents/deq/deq-whm-hwp-Michigan-Background-Soil-revJuly2005_248097_7.pdf

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MDEQ. 2010c. E-mail from MDEQ to ARCADIS Regarding an Evaluation of the Pore Water Discharge. June 8, 2010.

MDEQ. 2011a. Table 1. Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels; Part 213 Tier 1 Risk-Based Screening Levels (RBSLs). Document release date: March 25, 2011. Accessed at http://www.michigan.gov/documents/deq/deq-rrd-OpMemo_1-Attachment1Table3SoilCommercial_233124_7.pdf

MDEQ. 2011b. Table 2. Soil: Residential Part 201 Generic Cleanup Criteria and Screening Levels; Part 213 Tier 1 RBSLs. Document release date: March 25, 2011. Accessed at http://www.michigan.gov/documents/deq/deq-rrd-OpMemo_1-Attachment1Table2SoilResidential_283553_7.pdf

MDEQ. 2011c. Rule 57 Water Quality Values. Surface Water Assessment Section. MDEQ. December 5, 2011. http://www.michigan.gov/documents/deq/wrd-swas-rule57_372470_7.pdf

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Tables

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
King Highway Landfill Operable Unit

Table 1 - North Pore Water Outlet Sampling Results for Iron

Location ID: Date Collected:	Units	Groundwater Direct Contact Criterion & Risk-Based Screening Level[5]	USEPA NAWQC Freshwater CCC for Aquatic Life	NP-1 5/31/2012	NP-2 5/31/2012
Inorganics					
Iron	mg/L	58,000	1.0	531	2.62
Inorganics-Dissolved					
Iron	mg/L	58,000	1.0	ND [0.01]	0.45

Notes:

1. mg/L - milligrams per liter.
2. ND - Non-detect. The associated value in brackets is the analyte instrument detection limit.
3. NAWQC - National Ambient Water Quality Criteria.
4. CCC - Criterion Continuous Concentration.
5. The groundwater contact criterion and RBSL was taken from Table 1 of the Groundwater: Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels; Part 213 Tier 1 Risk-Based Screening Levels dated March 25, 2011.

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
King Highway Landfill Operable Unit

Table 2 - Final Cover Soil Sampling Results for Iron

Location ID: / Sample Depth (feet): / Date Collected:	Units	Direct Contact Criterion & Risk-Based Screening Level[3]	Michigan Background Soil Survey Mean Background Iron Concentration for Sand	RR-Sand-PL 0.5 – 2.5 5/31/2012	SV-Sand-PL 0.5 – 2.5 5/31/2012
Inorganics					
Iron	mg/kg	16,000	3,418	5,140	6,340

Location ID: / Sample Depth (feet): / Date Collected:	Units	Direct Contact Criterion & Risk-Based Screening Level[3]	Michigan Background Soil Survey Mean Background Iron Concentration for Topsoil	RR-Soil-VL 0 – 0.5 5/31/2012	SV-Soil-VL 0 – 0.5 5/31/2012
Inorganics					
Iron	mg/kg	16,000	2,432	NA	11,900

Notes:
1. mg/kg - milligrams per kilogram.
2. NA - Not analyzed.
3. Values were taken from Table 2 of the Soil: Residential Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels; Part 213 Tier 1 Risk-Based Screening Levels dated March 25, 2011.
4. Sample RR-Soil-VL was not analyzed for iron due to an error in completing the chain-of-custody.

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
King Highway Landfill Operable Unit

Table 3 - Historical Kalamazoo River Floodplain Soil Sampling Results for Iron

Sample ID:		G52080	G52085	G52108	G52109	G52110	G52111	B1-1	B1-2	B1-3	B2-1
Location:		Mill Lagoons	Mill Lagoons	Mill Lagoons	Mill Lagoons	Mill Lagoons	Mill Lagoons	KHL	KHL	KHL	KHL
Sample Matrix:		Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil
Sample Date:	Units	8/31/1999	8/31/1999	10/5/1999	10/5/1999	10/5/1999	10/5/1999	8/2/1993	8/2/1993	8/3/1993	8/4/1993
Inorganics											
Iron	mg/kg	5,700	6,600	15,000	6,400	6,500	18,000	5,300	6,500	7,200	3,900

Sample ID:		B2-2	B2-3	B3-1	B3-2	B3-3	BG-1	MW-8A	MW-8A	MW-1A	MW-9A
Location:		KHL	KHL	KHL	KHL	KHL	KHL	KHL	KHL	KHL	KHL
Sample Matrix:		Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil
Sample Date:	Units	8/4/1993	8/5/1993	8/5/1993	8/9/1993	8/5/1993	8/11/1993	7/30/1993	7/30/1993	7/28/1993	7/27/1993
Inorganics											
Iron	mg/kg	5,300	11,000	2,900	4,600	4,500	9,000	22,000	7,400 [8,300]	6,700	12,000

Sample ID:		KSHB-5	Z18026	Z18027	AMW-10B	AMW-3A	AMW-6B	AMW-7B	AMW-8B	AMW-9B	AS-1
Location:		KSSS	KSSS	KSSS	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU
Sample Matrix:		Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil
Sample Date:	Units	7/27/1993	6/22/1999	6/22/1999	7/29/1993	9/7/1993	8/9/1993	8/5/1993	7/26/1993	8/2/1993	8/16/1993
Inorganics											
Iron	mg/kg	4,300 [15,000]	5,700	3,700	15,000	3,200	15,000	7,600 [6,800]	45,000	8,400	11,000

Sample ID:		AS-2	AS-3	WB-1	WB-2	WB-3	WB-4	WB-5	WMW-1A	WMW-3A	WMW-4A
Location:		WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU	WB/A-Site OU
Sample Matrix:		Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil	Floodplain Soil
Sample Date:	Units	8/13/1993	8/16/1993	9/1/1993	8/30/1993	9/1/1993	8/31/1993	8/31/1993	7/26/1993	7/22/1993	7/21/1993
Inorganics											
Iron	mg/kg	15,000	8,400	6,500	6,400	24,000 [21,000]	6,900	3,200	7,100	10,000 [12,000]	13,000

Notes:
1. mg/kg - milligrams per kilogram.
2. KHL - King Highway Landfill.
3. KSSS - King Street Storm Sewer.
4. WB/A-Site OU - Willow Boulevard/A-Site Operable Unit.
5. Duplicate sample results are shown in brackets.
6. Floodplain soil sample results for iron for were provided in Technical Memorandum 6 King Highway Landfill Operable Unit dated March 1994; Technical Memorandum 9 Willow Boulevard/A-Site Operable Unit dated February 1995; Technical Memorandum 15 Mill Investigations dated August 1996; and the KHL OU Draft Final Report for Completion of Construction dated January 2012.

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
King Highway Landfill Operable Unit

Table 4 - Historical King Highway Landfill Groundwater Sampling Results for Iron

Sample ID:		MW-1	MW-1A	MW-2	MW-3	MW-5	MW-7	MW-8A
Location:		KHL	KHL	KHL	KHL	KHL	KHL	KHL
Sample Matrix:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:	Units	9/17/1993	9/17/1993	9/17/1993	9/20/1993	9/20/1993	9/16/1993	9/21/1993
Inorganics								
Iron	mg/L	6.8	13	14	11	7.8	4.4	31 [30]

Sample ID:		MW-8B	MW-9A	MW-9B	MW-9R	MW-10A	MW-10B	MW-10R
Location:		KHL	KHL	KHL	KHL	KHL	KHL	KHL
Sample Matrix:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:	Units	9/21/1993	9/21/1993	9/22/1993	9/21/1993	9/22/1993	9/22/1993	9/22/1993
Inorganics								
Iron	mg/L	12	13	7.3 [7.1]	R	4.8	4.7	47

Notes:
1. mg/L - milligrams per liter.
2. KHL - King Highway Landfill.
3. Duplicate sample results are shown in brackets.
4. Groundwater sample results for iron were provided in Technical Memorandum 6 King Highway Landfill OU dated March 1994.
5. R - Sample results were rejected.

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
King Highway Landfill Operable Unit

Table 5 - Historical Kalamazoo River Surface Water Sampling Results for Iron

Sample ID: Location: Sample Matrix: Sample Date:	Units	SWK-1 Kalamazoo River Surface Water 9/1/1994	SWK-1 Kalamazoo River Surface Water 8/14/1994	SWK-2 Kalamazoo River Surface Water 9/1/1994	SWK-2 Kalamazoo River Surface Water 8/14/1994	RG-1 Kalamazoo River Surface Water 10/11/1993	RG-1 Kalamazoo River Surface Water 10/15/1993	RG-2 Kalamazoo River Surface Water 10/11/1993	RG-2 Kalamazoo River Surface Water 10/15/1993
Inorganics									
Iron	mg/L	0.29	0.61	0.30	0.63	0.53	0.62 [0.57]	0.36	0.82

Notes:
1. mg/L - milligrams per liter.
2. Duplicate sample results are shown in brackets.
3. Surface water sample results for iron were provided in Technical Memorandum 9 Willow Boulevard/A-Site Operable Unit dated February 1995 and in Technical Memorandum 16 Surface Water Investigation dated March 1995.

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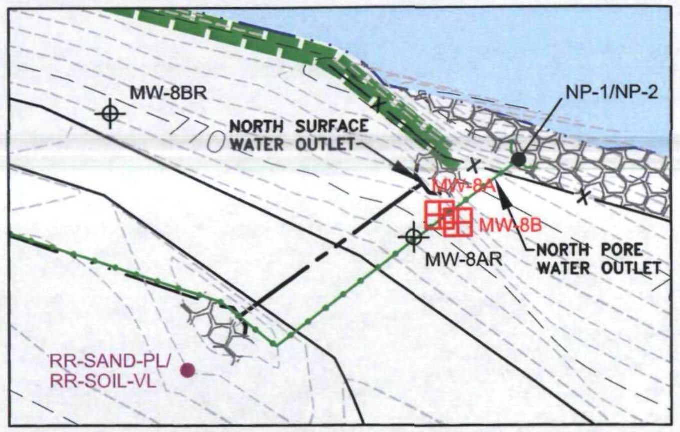
Figures

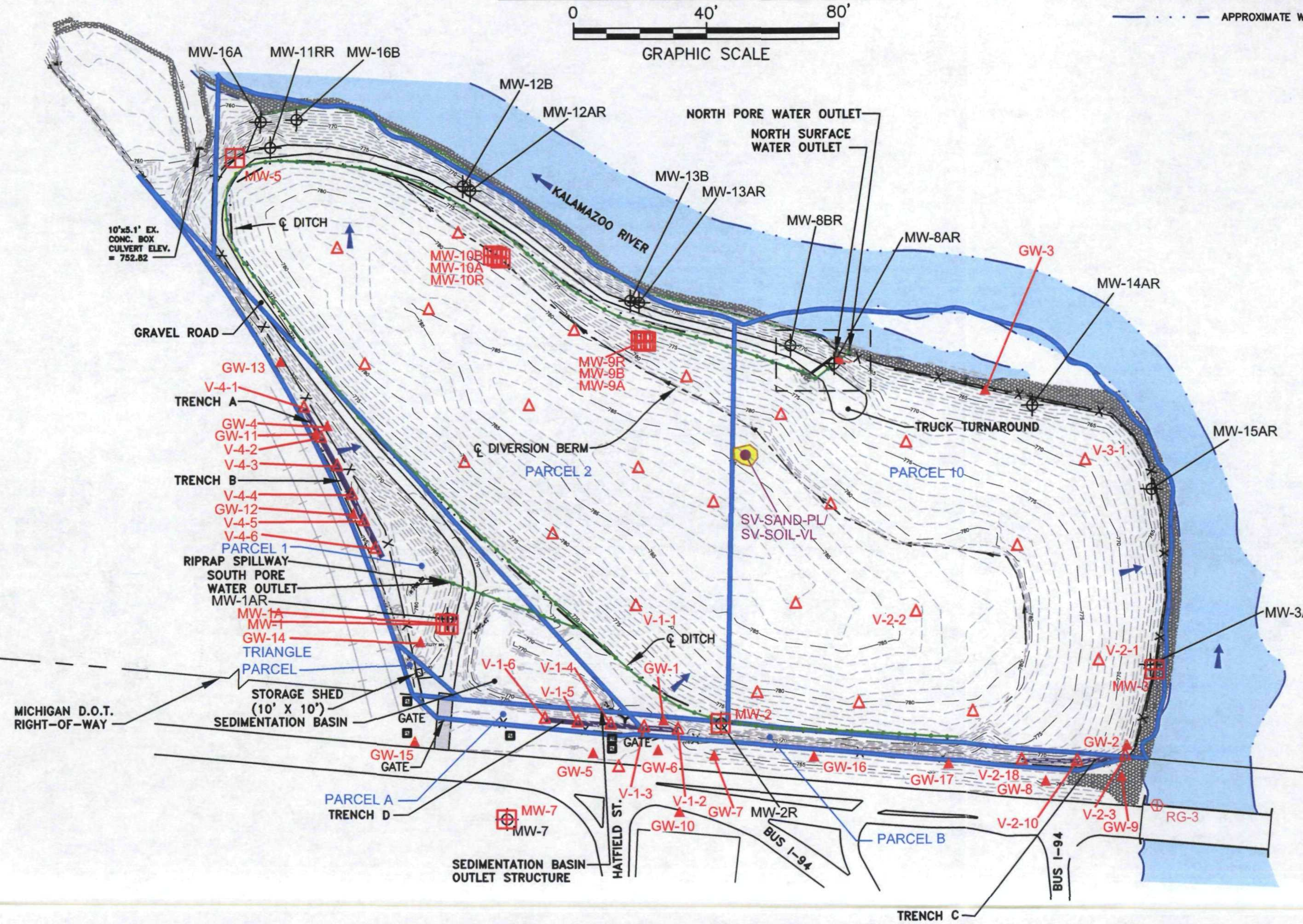


NORTH PORE WATER OUTLET DETAIL

0 40' 80'
GRAPHIC SCALE

LEGEND:

- APPROXIMATE PROPERTY BOUNDARY
- DITCH LINE
- ABANDONED RAILROAD
- SHEETPILE WALL
- ACCESS ROAD
- RIPRAP
- CULVERT PIPE
- FINAL AS-BUILT INDEX CONTOUR
- FINAL AS-BUILT INTERMEDIATE CONTOUR
- SECURITY FENCE
- PORE WATER COLLECTION PIPE
- PORE WATER DRAIN
- APPROXIMATE WATER EDGE
- GAS VENTS (ORIGINAL 23; ONLY FOUR WERE GIVEN IDs)
- V-1-2 CUTOFF TRENCH GAS VENTS
- LANDFILL GAS CUTOFF TRENCH
- FLOW DIRECTION
- MW-14 EXISTING MONITORING WELL
- MW-3 MONITORING WELLS FROM 1993 GROUNDWATER SAMPLING
- RG-3 RIVER GAUGE STATION
- GW-2 LOCATION OF GAS MONITORING PROBES
- APPROXIMATE LOCATION OF PERMANENT MARKERS
- NP-1/NP-2 APPROXIMATE LOCATION OF NORTH PORE WATER OUTFALL DISCHARGE SAMPLES
- SV-SAND-PL/ SV-SOIL-VL APPROXIMATE LOCATION OF FINAL COVER SOIL SAMPLES
- STRESSED VEGETATION AREA



0 200' 400'
GRAPHIC SCALE

NOTES:

1. BASE MAP INFORMATION OBTAINED FROM CADD DRAWING FILE DEVELOPED BY RMT, INC., ANN ARBOR, MICHIGAN (CADD FILE: L1630SU01.DWG AS-BUILT SURVEY; 8/21/00).
2. FINAL AS-BUILT CONTOUR ELEVATIONS ARE SHOWN AND ARE BASED ON A FIELD SURVEY BY ATWELL-HICKS, INC., DATED 9/27/00 WITH REVISIONS DATED 10/23/00, 12/21/01, 12/10/02, AND 7/24/03.
3. FINAL AS-BUILT CONTOUR ELEVATIONS OF SEDIMENTATION BASIN ARE BASED ON A FIELD SURVEY BY PREIN & NEWHOF, DATED 2/3/04.
4. PROPERTY BOUNDARY, AND FINAL AS-BUILT CONTOUR ELEVATIONS OF PARCEL C AND SURROUNDING AREAS BASED ON A FIELD SURVEY BY PREIN & NEWHOF, DATED 11/19/2010.
5. ELEVATIONS ARE BASED ON NGVD OF 1929 (MSL).
6. PROPERTY SURVEY PERFORMED BY WILKINS & WHEATON ENGINEERING CO., INC., ON 7/1/96.
7. TOPOGRAPHIC CONTOUR INTERVAL IS 1 FOOT.
8. LOCATIONS OF GW-5, GW-6, GW-7, GW-8, GW-9, AND GW-10 ARE BASED ON A FIELD SURVEY BY TERRA CONTRACTING LLC, DATED 9/23/05.
9. LOCATION OF GW-11 IS BASED ON A FIELD SURVEY BY TERRA CONTRACTING LLC, DATED 1/11/06.
10. LOCATIONS OF RG-6, V-4-4, V-4-5, AND V-4-6 ARE BASED ON A FIELD SURVEY BY TERRA CONTRACTING LLC, DATED 6/7/06.
11. LOCATIONS OF V-1-2 THROUGH V-1-6, V-2-3, V-2-10, AND V-2-18 ARE BASED ON MULTIPLE FIELD SURVEYS CONDUCTED BY TERRA CONTRACTING, LLC. IN APRIL 2008. GAS VENTS V-2-4 THROUGH V-2-9, AND V-2-11 THROUGH V-2-17 ARE NOT SHOWN FOR CLARITY PURPOSES (THESE VENTS ARE LOCATED ALONG TRENCH C).
12. LOCATION OF GW-12 IS APPROXIMATE.
13. LOCATIONS OF GW-13 THROUGH GW-17 BASED ON FIELD SURVEY CONDUCTED BY PREIN & NEWHOF ON 11/1/11.
14. LOCATION OF SHEETPILE WALL AND A PORTION OF THE MONITORING WELLS ARE BASED ON A FIELD SURVEY BY ATWELL-HICKS, INC. DATED 9/27/00.
15. PARCELS 1, 2, 10, A, B, AND THE TRIANGLE PARCEL ARE OWNED BY GEORGIA-PACIFIC.
16. GEORGIA-PACIFIC PURCHASED THE "TRIANGLE PARCEL" FROM THE MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) IN EARLY 2006.
17. GEORGIA-PACIFIC PURCHASED PARCELS A (PREVIOUSLY OWNED BY MDOT) AND B (PREVIOUSLY OWNED BY THE CITY OF KALAMAZOO) IN JUNE 2008, WHICH ARE LOCATED IN THE PORTION OF THE KING HIGHWAY (M-96) RIGHT-OF-WAY THAT IS ENCLOSED BY THE KING HIGHWAY LANDFILL SITE BOUNDARY FENCE IN JUNE 2008, WHICH IS COMPRISED OF PARCEL A (PREVIOUSLY OWNED BY MDOT) AND PARCEL B (PREVIOUSLY OWNED BY THE CITY OF KALAMAZOO).
18. GROUNDWATER MONITORING LOCATIONS FROM 1993 WERE TAKEN FROM TECHNICAL MEMORANDUM 6 KING HIGHWAY LANDFILL OU.

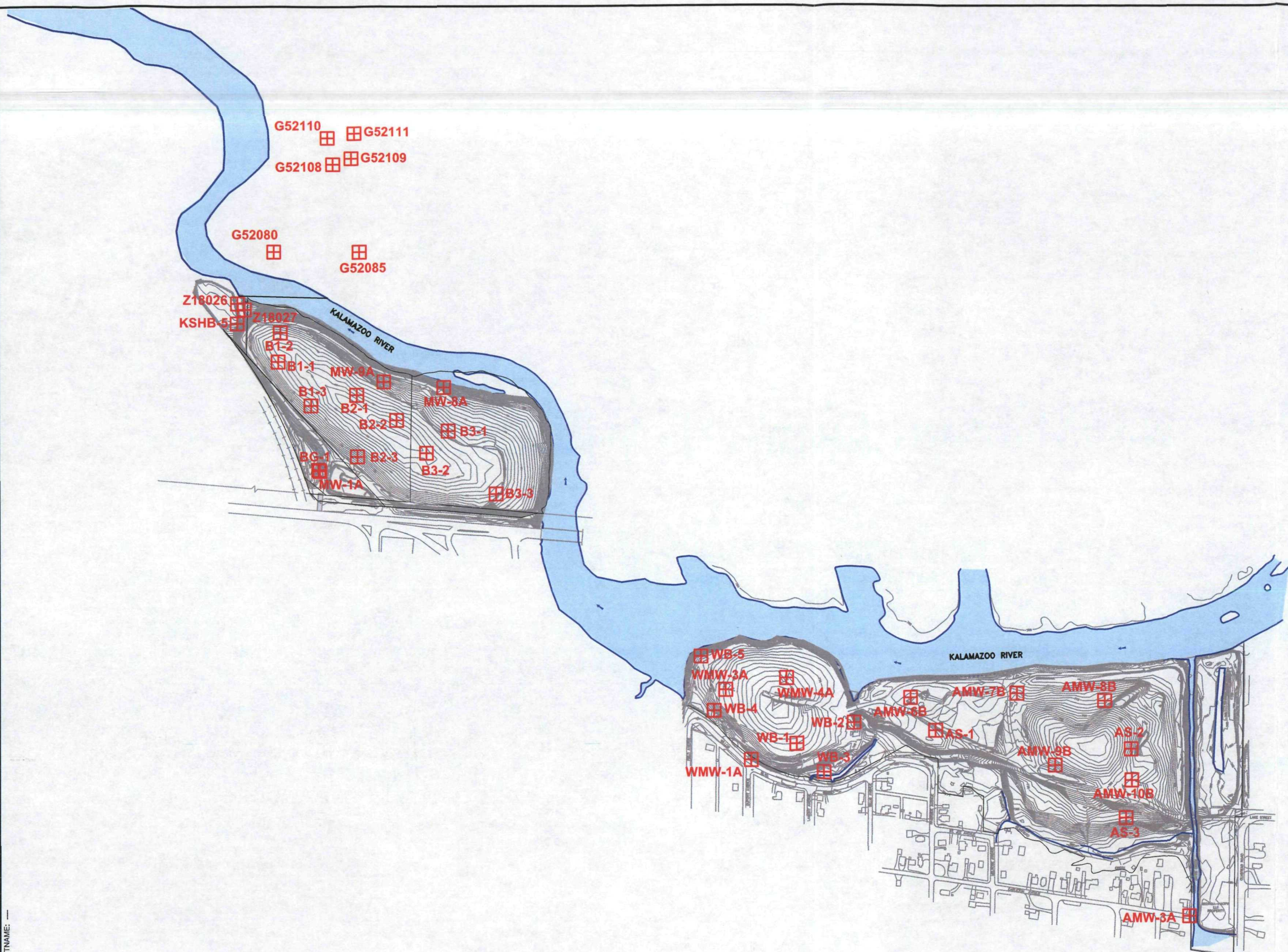
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE

NORTH PORE WATER OUTLET AND FINAL COVER SOIL SAMPLING RESULTS

PORE WATER AND SOIL SAMPLING LOCATIONS

ARCADIS

FIGURE 1



LEGEND

AMW-6B ⊞ FLOODPLAIN SOIL SAMPLE LOCATION

NOTES:

1. BASE MAP INFORMATION WAS DEVELOPED FROM FIELD SURVEY DATA OBTAINED BY PREIN & NEWHOFF IN DECEMBER 2009, MAY 2007, MAY 2006, MARCH 2012, AND AERIAL PHOTOGRAPHY FLOWN IN APRIL 1991 AND INFORMATION OBTAINED FROM CADD DRAWING FILE DEVELOPED BY RMT, INC., ANN ARBOR, MICHIGAN (CADD FILE: L1630SU01.DWG AS-BUILT SURVEY; 8/21/00).

2. THE FLOODPLAIN SOIL SAMPLE LOCATIONS WERE TAKEN FROM TECHNICAL MEMORANDUM 6 KHL OU DATED MARCH 1994; TECHNICAL MEMORANDUM 9 WILLOW BOULEVARD/A-SITE OPERABLE UNIT DATED APRIL 1995; TECHNICAL MEMORANDUM 15 MILL INVESTIGATIONS DATED AUGUST 1996; AND THE DRAFT FINAL REPORT FOR COMPLETION OF CONSTRUCTION FOR THE KHL OU DATED JANUARY 2012

0 500' 1000'

GRAPHIC SCALE

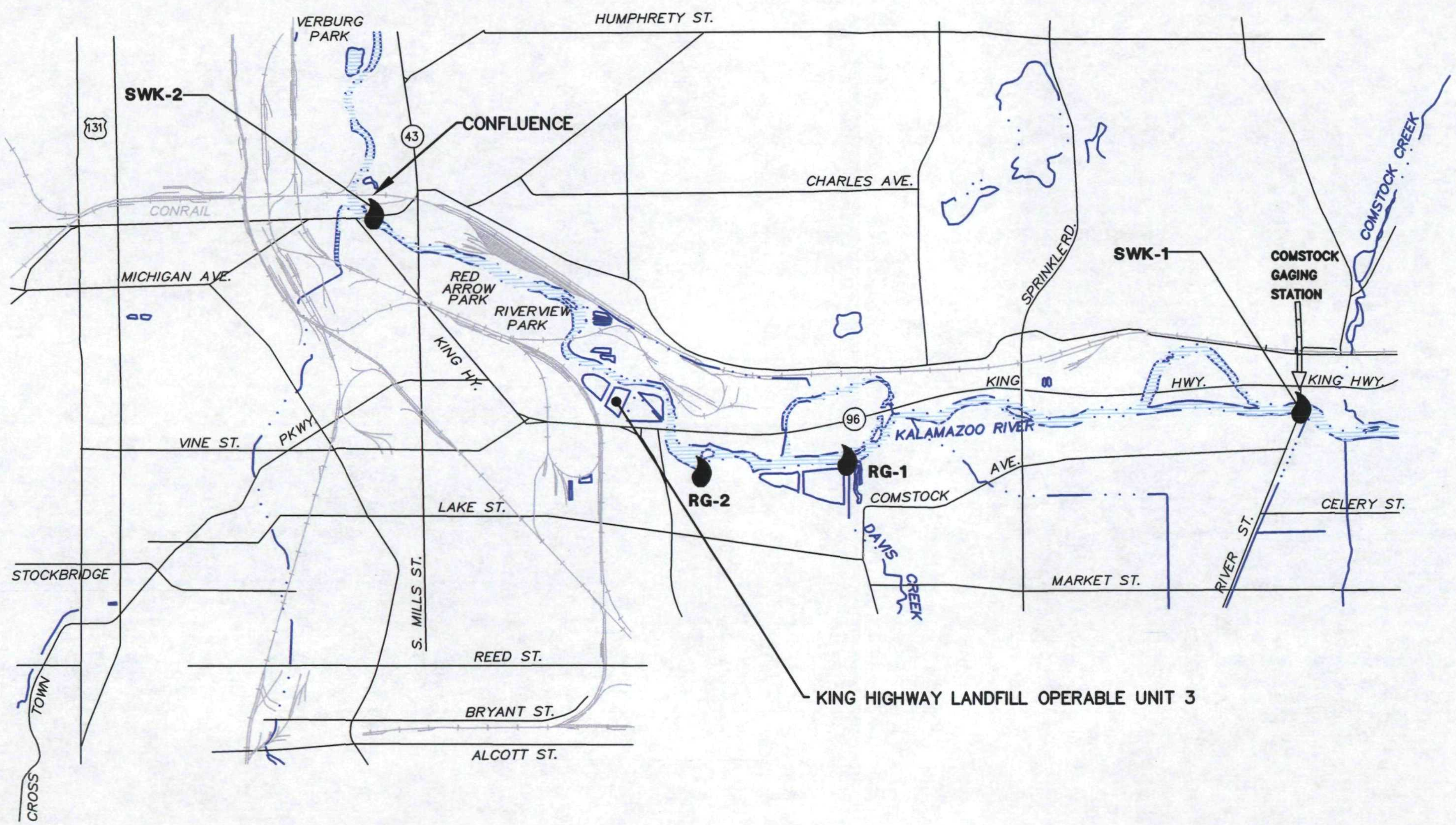
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
NORTH PORE WATER OUTLET AND FINAL COVER SOIL SAMPLING RESULTS

FLOODPLAIN SOIL SAMPLE LOCATIONS

ARCADIS

FIGURE
2

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: N. SAWYER L. FORAKER LD: PIC: D. COWIN PM: D. PENNIMAN TM: D. PENNIMAN LYR: ON=*;OFF=REF* PLOTTED: 8/14/2012 10:14 AM BY: FORAKER, LYDIA



LEGEND

SWK-1 — SURFACE WATER SAMPLE LOCATION

NOTES:

1. PLANIMETRIC MAPPING OBTAINED FROM MICHIGAN RESOURCE INFORMATION SYSTEMS.
2. THE SURFACE WATER SAMPLE LOCATIONS WERE TAKEN FROM TECHNICAL MEMORANDUM 9 FOR THE WILLOW BOULEVARD/A-SITE OPERABLE UNIT DATED APRIL 1995 AND TECHNICAL MEMORANDUM 16 SURFACE WATER INVESTIGATION DATED MARCH 1995.

0 2400' 4800'

GRAPHIC SCALE

ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
NORTH PORE WATER OUTLET AND FINAL COVER SOIL SAMPLING RESULTS

SURFACE WATER SAMPLING LOCATIONS UPSTREAM AND DOWNSTREAM OF KING HIGHWAY LANDFILL

ARCADIS

FIGURE
3